of FIG. 1, taken along line 2-2. The embodiment of FIGs. 1 and 2 is a 20 GHz K band 360° reflective coplanar waveguide phase shifter 10 <u>(see FIG. 1)</u>. The phase shifter 10 <u>(see FIG. 1)</u> has an input/output 12 <u>(see FIG. 1)</u> connected to a 50-ohm microstrip line 14 <u>(see FIG. 1)</u>. The 50-ohm microstrip line 14 <u>(see FIG. 1)</u> includes a first linear line 16 and two quarter-wave microstrip lines 18, 20, each with a characteristic impedance of about 70 ohm. The microstrip line 14 is mounted on a substrate 22 <u>(see FIG. 1 and FIG. 2)</u> of material having a low dielectric constant. The two quarter-wave microstrip lines 18 <u>(see FIG. 1)</u>, 20 <u>(see FIG. 1)</u>are transformed to coplanar waveguides (CPW) 24 <u>(see FIG. 1)</u> and 26 <u>(see FIG. 1)</u> and match the line 16 to coplanar waveguides 24 <u>(see FIG. 1)</u> and 26 <u>(see FIG. 1)</u>. Each CPW includes a center strip line 28 <u>(see FIG. 1 and FIG. 2)</u> and 30 <u>(see FIG. 1 and FIG. 2)</u> respectively, and two conductors 32 <u>(see FIG. 1 and FIG. 2)</u> and 34 <u>(see FIG. 1 and FIG. 2)</u> forming a ground plane 36 <u>(see FIG. 1)</u> on each side of the strip lines. The ground plane conductors are separated from the adjacent strip line by gaps 38 <u>(see FIG. 1)</u>, 40 <u>(see FIG. 1)</u>, 42 <u>(see FIG. 1)</u> and 44<u>(see FIG. 1)</u>. The coplanar waveguides 24 <u>(see FIG. 1)</u> and 26 <u>(see FIG. 1)</u> have a characteristic impedance of about Z24 = 15 Ohms and Z26 = 18 ohms, respectively (as shown in FIG. 3). The difference in impedances is obtained by using strip line conductors having slightly different center line widths. The coplanar waveguides 24 <u>(see FIG. 1)</u> and 26 <u>(see FIG. 1)</u> work as resonators. Each coplanar waveguide is positioned on a tunable dielectric layer 46 (shown in FIG. 2). The conductors that form the ground plane are connected to each other at the edge of the assembly. The waveguides 24 <u>(see FIG. 1)</u> and 26 <u>(see FIG. 1)</u> terminate at open ends 48 <u>(see FIG. 1)</u> and 50 <u>(see FIG. 1). Also shown in FIG. 2 are center strips 28 and 30 as well as two conductors 32 and 34. Further, FIG. 3 illustrates the coplanar waveguides 24 and 26 have a characteristic impedance of about Z_{24} = 15 Ohms and Z_{26} = 18 ohms, respectively, as well as the 50-ohm microstrip line 14 includes a first linear line 16 and two quarter-wave microstrip lines 18, 20, each with a characteristic impedance of about 70 ohm.</u>--

Please replace the paragraph beginning on page 8, line 11 as follows:

--The K and Ka band coplanar waveguide phase shifters of the preferred embodiments of this invention are fabricated on a tunable dielectric film with a dielectric constant (permittivity) ~~ro~~ of around 300 to 500 at zero bias and a thickness of 10 micrometer. However, both thin and thick films of the tunable dielectric material can be used. The film is deposited on a low dielectric constant substrate MgO only in the CPW area with thickness of 0.25 mm. For the purposes of this description a low dielectric constant is less than 25. MgO has a dielectric constant of about 10. However, the substrate can be other materials, such as $LaAlO_3$, sapphire, $A1_2\cancel{\theta}O_3$ and other ceramics. The thickness of the film of tunable material can be adjusted from 1 to 15 micrometers depending on deposition methods. The main requirements for the substrates are their chemical stability, reaction with the tunable film at film firing temperature (~1200 C), as well as dielectric loss (loss tangent) at operation frequency.--

Please replace the paragraph beginning on page 8, line 23 as follows:

--FIG. 4 is a top plan view of a 30 GHz coplanar waveguide phase shifter assembly 60 constructed in accordance with this invention with coplanar waveguide 62 positioned on a layer of tunable dielectric material 80. FIG. 5 is a cross-sectional view of the phase shifter assembly 60 of FIG. 4, taken along line 5-5 with electrodes 66 and 68 separated from electrodes 82 and 84 respectively by gaps 86 and 88. Phase shifter assembly 60 is fabricated using a tunable dielectric film and substrate similar to those set forth above for the phase shifter of FIGs. 1 and 2. Referring to FIG. 4, a~~A~~ssembly 60 includes a main coplanar waveguide 62 including a center line 64 and a pair of ground plane conductors 66 and 68 separated from the center line by gaps 70 and 72. The center portion 74 of the coplanar waveguide has a characteristic impedance of around 20 ohms. Two tapered matching sections 76 and 78 are positioned at the ends of the waveguide and form impedance transformers to match the 20-ohm impedance to a 50-ohm impedance. Coplanar waveguide 62 is positioned on a layer of tunable dielectric material 80. Conductive electrodes 66

and 68 are also located on the tunable dielectric layer and form the CPW ground plane. Additional ground plane electrodes 82 and 84 are also positioned on the surface of the tunable dielectric material 80. Electrodes 82 and 84 are adjacent to tunable dielectric material 80 as shown in FIG. 5. Electrodes 66 and 68 are separated from electrodes 82 and 84 respectively by gaps 86 and 88. Gaps 86 and 88 block DC voltage so that DC voltage can be biased on the CPW gaps. For dielectric constant ranging from about 200 to 400 and an MgO substrate, the center line width and gap are about 10 to 60 micrometers. Referring to Fig. 5, t~~T~~he tunable dielectric material 80 is positioned on a planar surface of a low dielectric constant (about 10) substrate 90, which in the preferred embodiment is MgO with thickness of 0.25 mm. However, the substrate can be other materials, such as $LaAlO_3$, sapphire, $A1_2$~~0~~O_3 and other ceramic substrates. A metal holder 92 extends along the bottom and the sides of the waveguide. A bias voltage source 94 is connected to strip 64 through inductor 96.--

Please replace the paragraph beginning on page 9, line 23 as follows:

--FIG. 6 shows a 20 GHz coplanar waveguide phase shifter 98, which has a structure similar to that of FIGs. 4 and 5. However, a zigzag coplanar waveguide 100 having a central line 102 is used to reduce the size of substrate. FIG. 7 is a cross-sectional view of the phase shifter of FIG. 6, taken along line 7-7. The waveguide line 102 has an input 104 (see FIG. 6) and an output 106 (see FIG. 6), and is positioned on the surface of a tunable dielectric layer 108. A pair of ground plane electrodes 110 and 112 are also positioned on the surface of the tunable dielectric material and separated from line 102 by gaps 114 and 116. The tunable dielectric layer 108 is positioned on a low loss substrate 118 similar to that described above. The circle near the middle of the phase shifter is a via 120 (see FIG. 6) for connecting ground plane electrodes 110 and 112. ~~and includes 50 ohm microstrip line 14 which further includes a first linear line 16 and two quarter-wave microstrip lines 18, 20, each with a characteristic impedance of about 70 ohm. The microstrip line 14 is mounted on a substrate 22 of material having a low dielectric constant. The~~

~~two quarter-wave microstrip lines 18, 20 are transformed to coplanar waveguides (CPW) 24 and 26 and match the line 16 to coplanar waveguides 24 and 26.~~ The waveguide line 102 of FIG. 6 has an input 104 and an output 106, and is positioned on the surface of a tunable dielectric layer 108. Referring to FIGs. 6 and 7, a~~A~~ pair of ground plane electrodes 110 and 112 are also positioned on the surface of the tunable dielectric material and separated from line 102 by gaps 114 and 116. The tunable dielectric layer 108 is positioned on a low loss substrate 118 similar to that described above. The circle near the middle of the phase shifter is a via 120 for connecting ground plane electrodes 110 and 112 as shown in FIG. 6.--

Please replace the paragraph beginning on page 10, line 25 as follows:

--A microstrip line and the coplanar waveguide line can be connected to one transmission line. FIG. 10 is a top plan view of another phase shifter 136 constructed in accordance with the present invention. FIG. 11 is a cross-sectional view of the phase shifter of FIG. 10, taken along line 11-11. FIG~~s~~. 10 shows how the microstrip 138 line transforms to the coplanar waveguide assembly 140. Referring to FIG. 10, t~~T~~he microstrip 138 includes a conductor 142 (top plan view in FIG. 10 and cross section view in FIG. 11) mounted on a substrate 144 (top plan view in FIG. 10 and cross section view in FIG. 11). The conductor 142 (top plan view in FIG. 10 and cross section view in FIG. 11) is connected, for example by soldering or bonding, to a central conductor 146 (top plan view in FIG. 10 and cross section view in FIG. 11) of coplanar waveguide 148 (top plan view in FIG. 10). Ground plane conductors 150 (FIG. 10) and 152 (FIG. 10) are mounted on a tunable dielectric material 154 (top plan view in FIG. 10 and cross section view in FIG. 11) and separated from conductor 146 (top plan view in FIG. 10 and cross section view in FIG. 11) by gaps 156 and 158 of FIG. 10. In the illustrated embodiment, solder 160 (top plan view in FIG. 10 and cross section view in FIG. 11) connects conductors 142 and 146 (top plan view in FIG. 10 and cross section view in FIG. 11). Referring to FIG. 11, the tunable dielectric material 154 is mounted on a surface of a non-tunable dielectric substrate 162. Substrates 144 and 162 (top plan